while the fact that the gases in passing through the small tubes would encounter much greater resistance than in the single flue rendered the successful employment of the multitubular boiler dependent on the increased action he could give to the blast. However in all respects he came out right in the very first trial.

In the "Rocket" he had a self-moving machine, which resembled the moving animal not only in the fact that they both derived their power of motion from the combustion of carbon, but the physiology of the machine resembled that of the animal system in that essential particular which connects the action of the heart and lungs with that of the muscles, so that any demand upon the activity of the latter is at once met by increased activity in the former. In the locomotive the law of adjustment is perfect. Whatever the load within the limit imposed by the adhesion of the wheels, and whatever the speed, the stimulating action on the fire is sufficient, and no more than sufficient, while in all cases the tubes are sufficiently long, and no more, to pass the heat generated into the boiler.

The functions of the locomotive engine more nearly correspond with the functions of moving animals than do the functions of any other machine, and hence it was essential that there should be a correspondence between the organisation of the locomotive and that of working animals, which correspondence may be dispensed with in other engines. Is it not probable, we ask, that he who produced the locomotive physiologically complete had been guided, however unconsciously, by the truth of his observation of those animals which his machine was to set free from their task? OSBORNE REYNOLDS

THE HISTORY OF SALT

The History of Salt. By Evan Marlett Boddy. (London: Baillière, Tindall, and Cox, 1881.)

THIS book is quite a literary curiosity: the author hopes, and not without reason, that it will be found to afford amusement. Mr. Boddy we take to be a medical student, and it is a kindness to him to suppose that he is young. After reading the first half-dozen pages of his work the idea gradually dawned upon us that he intended it for an elaborate joke, very much after the manner, we should suppose, of Mr. Benjamin Allen and Mr. Robert Sawyer, had those gentlemen been tempted to follow the paths of literature. But, *adhibenda est in jocando moderatio*, and never more so than when the joke is at the expense of a venerable parent. In dedicating his work to his father Mr. Boddy, for the credit of human nature, must be acquitted of the charge of a conscious joke, otherwise such an instance of filial disrespect would be without parallel.

This astonishing production owes its origin to a letter advising total abstention from salt, which had appeared in a temperance journal, and the author felt himself constrained, for the good of humanity, to deliver himself of the succession of "*farcical puerilities*" and "*whimsical crudities*" which make up the "*imaginative plerophory*" "*redundant of inane folly and trivial hyperbole*" of his book. The words in italics are Mr. Boddy's; he of course applies them to the opinions of other people. With the sanction of Vespasian's law, that it is unlawful to give ill language first, but civil and lawful to return it, we think ourselves justified in applying them to Mr. Boddy's book. And how richly that book merits them we proceed to make abundantly clear, and on the author's own showing.

Mr. Boddy is too hard upon the unfortunate letter-writer in the journal of temperance: he is not even grateful to him as the remote cause of the existence of his own book. The letter-writer, "with amusing self-complacency, accused it [salt, not temperance] of producing evils of an astounding nature—such is the latitude of pragmatical ignorance and silly egotism. The palpable absurdity of such an argument must be apparent even to the most careless thinker: it is with the view of exposing such a fallacy, both injurious and irrational, that I have written this treatise." One is tempted to ask—If the argument is so palpably absurd, even to the most careless thinker, why in the world has Mr. Boddy taken the trouble to write his treatise?

It does not seem to be generally known what would happen to a world devoid of salt; such, according to Mr. Boddy, is the "dense obtenebration with which the subject is surrounded." The picture of a saltless world, as drawn by our author, is something awful to contemplate. Nothing but the thought of "our ignorant conceits," our "unaccountable obliquity of judgment," and "the apathetic indifference" with which we have hitherto looked upon the humble condiment which has graced our tables "in the smallest receptacles, as if it were the most expensive article," and to which we, "in the most finical, grotesque manner," help ourselves "in almost infinitesimal quantities, as if it were a mark of good breeding and delicacy," would compel us to reveal the "imaginative plerophory." The nervous reader will be pleased to fortify himself with at least a teaspoonful of the condiment before he begins its perusal.

> "Were the human race once deprived of the chloride of sodium, even for a limited period of time, we should not only lose a natural healthful incentive for our food, but disease, with all her attendant miseries, would spread with such relentless impetuosity as would defy, and even paralyse, the efforts of the most skilful physician, the ingenuity of the surgeon, and the scientific improvements and hygienic precautions of the sanatarian. The strength and vigour of manhood would fade as if blasted by disease, food would act as a poison, the blood would not be replenished with the salt which it requires, and consequently our skins would soon be covered with corruption, our cattle would die, our crops would be nipped in the bud, the air would be full of offensive insects, the soil would become foul and barren, the sea a waste of stagnant waters, and all the beautiful productions of nature would wither and decay, and our glorious earth would degenerate into a hideous solitude, solely inhabited, very probably, by monsters horrible to behold, more repulsive than those gigantic reptiles which once roamed by the dreary marshes of an incomplete world."

And yet, according to Mr. Boddy, "the English working classes are nearly, if not altogether, unacquainted with the benefit of salt": "at the tables of the wealthy it is perfectly absurd to see the small amount which is used." We are not even allowed the poor consolation of knowing that in our false economy we are unwittingly conserving our choicest blessing. "We do not diet ourselves as we should: in this respect we are far behind the veriest

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savage, cannibal though he be." We cannot inure ourselves to salt at too early an age; we ought indeed to pickle our babies: "To rub new-born infants with salt" is a practice "in every respect cleanly" and "strictly conducive to health."

Mr. Boddy has evidently spent much pains on his history: but, as he confesses, in trying to begin at the beginning he has laboured under many difficulties. He has traced the history of salt from the time of Moses and Job by the aid of such written records as he has been able to meet with, but on the question of its history before their time he is obliged to fall back on his inner consciousness.

"The origin of salt is one of those enigmas of nature which as yet has completely frustrated the most accomplished and scientific geologists, and no suggestion has yet been made which will satisfactorily and conclusively account for its formation; for whatever hypothesis has been stated there is sure to be an objection so difficult to overcome that the author has been fain to admit that it is thoroughly impracticable, and therefore inadmissible."

Even our author is fain to express himself guardedly on this point—

"If we take salt as a whole, leaving out of the question altogether the different conditions in which it is found, and with no reference at all to its existing either in the earth, above the earth, in lakes, or in the sea, but looking at it simply as it is, a mass of rock, or a volume of water holding it in solution, it inclines one to the belief that it possesses a dual inchoation, though the original source of both may have been connate; but owing to extraneous causes which were brought to bear, one branch became crystallised rock-salt, while the other, through immaturity, remains in a state of solution."

"Why the sea is salt" has given rise to many pretty fables: Mr. Boddy invents still another fable; but it is not at all pretty: it is that "sea-water is the result of some subterranean communication with reservoirs of salt through the media of volcanic foci" (p. 53). This perhaps hardly does justice to Mr. Boddy's powers of narrative: the picture of the saltless world proves that he can do better; and yet even this is surpassed by that of the insect world of Cheshire on a rainy day (p. 60). But it is scarcely fair in the interests of the book itself to quote all its best things, even if our space and the reader's patience were longer.

Mr. Boddy is apprehensive of the reviewers: "An unknown author is placed at a great disadvantage and at the mercy of those who may laud a book to the skies if they please, satirically criticise another, and pass over a third with a sarcastic smile or a significant shrug of the shoulders. I am afraid that my little volume will unfortunately be found among the latter, but I candidly acknowledge that I hope it will be regarded as belonging to the first, or at least the second."

Our theory of the origin of this book differs somewhat from that of its author, as given above; Mr. Boddy's father (to whom the book is dedicated) was, we are informed, a ship's surgeon; and it occurs to us that this book is the result of the molecular motion of a brain which can trace its ancestry to a prolonged regimen of salt junk and pickled pork. It is the most striking instance of heredity we have yet met with, and despite our fear that Mr. Boddy may describe our notion as "a brazen assertion and a subtle paralogism," we commend it to the notice of Mr. Francis Galton.

OUR BOOK SHELF

Text-Book of Practical Organic Chemistry for Elementary Students. By H. Chapman Jones. 100 pp. (London: Joseph Hughes, 1881.)

MOST teachers of organic chemistry have felt that if their students could be made to work through a fairly simple series of typical experiments the work of learning would be rendered easier, and the knowledge gained would be made more definite and more real. Just such a series of experiments is described in this little work by Mr. Chapman Jones. The experiments are well chosen and clearly described; no costly apparatus is required, yet the student who works carefully through the book will certainly have laid a solid basis of knowledge of organic chemistry on which he may build a satisfactory structure.

An outline of methods whereby organic acids may be detected is given towards the end of the book, but the main part is devoted to experiments illustrative of fractional distillation and precipitation, formations and general properties of leading hydrocarbons, alcohols, and acids, etherification, &c.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

Trevandrum Observatory

As I was reading in a recent issue of your valuable journal (vol. xxiii. p. 482) a letter on the magnetic storm of August, 1880, showing the universality and simultaneity of the disturbance by comparing the observations at Greenwich, Toronto, Zi-ka-Wei, and Melbourne, I felt curious to know whether any such disturbance was noted here in the Government Observatory, and if so, whether the time corresponded with that given in your paper. On my application the gentleman in charge of the Observatory put into my hands, the inclosed abstract for the whole month of August, which I herewith forward to you. It contains, as you will see, not only the magnetic observations with the unifilar, bifilar and balance, but also the meteorological data for the necessary correction, &c. The reference throughout the paper is to the local time, which may be easily reduced to the Greenwich time, as the longitude is given. The observations, I may add, are quite reliable, though made by native agency, and I hope may prove useful on this occasion. But the paper inclosed I fear is too long to find room in your crowded columns, and what I beg you to do is to place it at the disposal of any of your scientific contributors or friends who take an interest in the question of terrestrial magnetism, and may be therefore expected to make use of the material here furnished.

A word more before I close. Your readers might know this observatory, said to be situated near the magnetic equator, was once in a very flourishing condition under the direction of Mr. John Allan Broun. On his retirement to Europe the establishment was reduced and a limited series of observations introduced, which he continued to direct till his recent demise. Since then the observations recorded are lying unused for the want of a scientific chief. If any scientific gentleman or society should generously offer some help in the way of directing the labours of this institution, I venture to think that the Government would gladly avail itself of such help, and the cause of science could then be materially promoted.

P. SOONDREM PILLAY

H.H. the Maharajah's College, Trevandrum, Trevancore,
South India, May 6

Symbolical Logic

FRESH criticism of my logical writings in a work just published ("Symbolic Logic," by John Venn, M.A., Fellow and Lecturer in the Moral Sciences, Gonville and Caius College, Cambridge) must be my excuse for troubling the editor and readers of NATURE with a third letter on the above subject.

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